

RISK FACTORS FOR CHILD MALTREATMENT IN ALLEGHENY COUNTY

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ABSTRACT

Child maltreatment remains a substantial public health issue in the United States. Increasing efforts in early prevention included exploration of trends and the etiology of various forms of abuse and neglect and demonstrated important characteristics of victims and perpetrators. Current understanding of maltreatment causation utilizes an ecological framework with risk factors in four domains including child factors, parent or caregiver traits, family characteristics, and community features. Adverse childhood experiences, including child maltreatment, have long-lasting and substantial effects on poor health outcomes and economic burdens. By recognizing prevalent risk factors in the community, targeted interventions can be implemented to address these risks, reduce and prevent child maltreatment.

The objective of this report was to describe the prevalence of risk factors for maltreatment in Allegheny County in each level of the ecological framework and compare the prevalence of these factors in Allegheny County with Philadelphia County. Data was extracted from publicly available sources on child, maternal, family, and community risk factors from 2007 to 2011. A lack of improvement in premature births and births to unmarried mothers occurring in Allegheny County was found. Premature births increased from 11.7% to 13.1% during this period and remained significantly different from the incidence in Philadelphia County from 2007 to 2009 (all p -values < 0.0001) with no difference in 2010 ($p=0.37$) and 2011 ($p=0.73$). The prevalence of births to unmarried mothers was 38.8% and 38.6% in 2007 and 2011 but was

significantly lower than Philadelphia County during each year examined (all p-values<0.0001). Allegheny County had a higher prevalence in each examined year of maternal tobacco use during pregnancy compared to Philadelphia County (all p-values<0.0001). The unemployment and poverty rates in Allegheny County were lower and significantly different from Philadelphia County during each year examined (all p-values<0.0001). However, there were increases in unemployment (4.1% to 7.0%) and poverty (11.6% to 13.4%) in the county from 2007 to 2011. Appropriate interventions that address these risks and support maltreatment prevention are needed.

TABLE OF CONTENTS

PREFACE.....	XI
1.0 INTRODUCTION.....	1
1.1 CHILD MALTREATMENT IN THE UNITED STATES	1
1.2 AN ECOLOGICAL APPROACH TO CHILD MALTREATMENT AND RISK FACTORS	3
1.2.1 Child Risk Factors	4
1.2.2 Parent or Caregiver Risk Factors	4
1.2.3 Family Risk Factors.....	5
1.2.4 Community Risk Factors	5
1.3 OVERALL ECOLOGICAL MODEL IN ALLEGHENY COUNTY.....	6
1.4 LONG-TERM IMPACTS AND PUBLIC HEALTH SIGNIFICANCE	7
1.5 OBJECTIVES.....	9
2.0 METHODS	11
2.1 DATA SOURCES	11
2.2 RISK FACTOR DEFINITIONS	12
2.2.1 Child Risk Factors	12
2.2.2 Maternal Risk Factors.....	12
2.2.3 Family Risk Factors.....	13

2.2.4	Community Risk Factors	13
2.3	DATA ANALYSIS.....	14
3.0	RESULTS	15
3.1	INCIDENCE OF CHILD RISK FACTORS IN ALLEGHENY COUNTY	15
3.2	PREVALENCE OF MATERNAL RISK FACTORS IN ALLEGHENY COUNTY.....	16
3.3	PREVALENCE OF FAMILY RISK FACTORS IN ALLEGHENY COUNTY.....	17
3.4	PREVALENCE OF COMMUNITY RISK FACTORS IN ALLEGHENY COUNTY.....	19
4.0	DISCUSSION	20
4.1	RISK FACTOR IMPORTANCE.....	20
4.2	PREVENTION STRATEGIES	22
4.3	STRENGTHS & LIMITATIONS.....	24
4.4	CONCLUSION	26
4.5	FUTURE IMPLICATIONS.....	26
	APPENDIX A: TABLES.....	28
	APPENDIX B: FIGURES	30
	BIBLIOGRAPHY	37

LIST OF TABLES

Table 1. Prevalence of Risk Factors for Child Maltreatment in Allegheny County and Philadelphia County: 2007-2011	29
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LIST OF FIGURES

Figure 1 Preterm Births (<37 Weeks Gestation) by Year in Allegheny County and Philadelphia County, PA.....	30
Figure 2 Low Birth Weight Births (<2,500 grams) by Year in Allegheny County and Philadelphia County, PA.....	31
Figure 3 Maternal Tobacco Use by Year in Allegheny County and Philadelphia County, PA....	31
Figure 4 Young Maternal Age (<20 Years) by Year in Allegheny County and Philadelphia County, PA.....	32
Figure 5 Low Maternal Education (< High School) by Year in Allegheny County and Philadelphia County, PA.....	32
Figure 6 Late or No Prenatal Care by Year in Allegheny County and Philadelphia County, PA	33
Figure 7 Births to Unmarried Mothers by Year in Allegheny County and Philadelphia County, PA	33
Figure 8 Third or Higher Births (At Least Two Previous Children) by Year in Allegheny County and Philadelphia County, PA.....	34
Figure 9 Births to Mothers Using Medicaid by Year in Allegheny County and Philadelphia County, PA.....	34

Figure 10 Births to Mothers Using WIC by Year in Allegheny County and Philadelphia County, PA	35
Figure 11 Unemployment by Year in Allegheny County and Philadelphia County, PA	35
Figure 12 Figure 12. Poverty by Year in Allegheny County and Philadelphia County, PA	36

PREFACE

I would like to express my appreciation to my faculty advisor and committee chair, Dr. Ping Tepper, for her endless guidance with this essay and throughout my entire graduate career. I would also like to thank Dr. Nancy Glynn and Dr. Martha Terry for serving on my master's essay committee. The committee's helpful feedback and encouraging words contributed greatly to its success and completion. Finally, I would like to thank my family for their support and for always being there for me.

1.0 INTRODUCTION

1.1 CHILD MALTREATMENT IN THE UNITED STATES

Over the years, child maltreatment has remained a significant problem in the United States despite increasing public concern and awareness.^{1, 2} Child maltreatment encompasses all forms of abuse and neglect by an individual tasked with custodial responsibilities such as a parent, caregiver, or coach and can therefore take on many forms.³ Under the Federal Child Abuse Prevention and Treatment Act (CAPTA), physical abuse includes harm brought upon a child as a result of kicking, hitting with hands or an object, shaking, choking, burning or any other demonstration of force regardless of intention. The law defines emotional abuse as behavior that harms a child's self-worth or emotional development. Acts of sexual abuse take on many forms of involving a child in sexually explicit acts including indecent exposure, fondling, and rape through enticement, coercion, simulation, or any other form of exploitation.⁴ In contrast to these acts of commission, child neglect represents acts of omission by failing to provide for a child's basic needs such as physical, medical, emotional, or educational needs.⁵

The Children's Bureau at the Administration for Children & Families reported 686,000 unique victims of child abuse and neglect to Child Protective Services (CPS) in federal fiscal year (FFY) 2012. Utilizing data from the National Child Abuse and Neglect Data System (NCANDS), each child was counted once irrespective of repeat occurrences for that child during

the reporting year. Of these unique victims, the majority of children, 78.3%, suffered from neglect while fewer experienced physical or sexual abuse at 18.3% and 9.3%, respectively. As a direct result of abuse and neglect, 1,640 children were estimated to have died in 2012.⁶ Yet research suggests that only about one tenth of actual abuse instances are substantiated by official social services. In a series of four papers published in *The Lancet*, researchers assessed the growing evidence of maltreatment in high-income countries. Investigators found that between 4% and 16% of children experienced physical abuse each year, 10% suffered from neglect or psychological abuse, and up to 15% of boys and 30% of girls suffer any form of sexual abuse.⁷

Characteristics of the perpetrators and victims further elucidate the context surrounding the problem of child maltreatment by describing the individuals involved. The youngest children had the highest risk and remained the predominant age group among cases reported to authorities in FFY 2012, in which 26.8% of victims were younger than age three and 19.9% occurred in children in the three to five years age group.⁶ Types of maltreatment vary by age, but overall, children under one year of age are at the highest rate of victimization at 21.9 per 1,000 children of the same age population.⁶ While the maltreatment rate and percentage generally declined with age, research has indicated rates of exposure may increase with age but are concealed by underreporting to welfare agencies of maltreatment against older children.^{6,8} Children experiencing one type of maltreatment are at greater risk for subsequent victimizations and often experience other types of maltreatment.. This repeated and diverse maltreatment produces early traumatic stress for these children, with the literature often describing victimization often as a “condition” rather than an “event.”^{7,9} Frequently, this abuse goes unreported as child protection agencies do not typically record several types of abuse.⁷ Victims in FFY 2012 were predominantly White, Hispanic, and African American at 44.0%, 21.8% and 21.0%

respectively.⁶ Boys and girls suffer maltreatment equally as demonstrated in FFY 2012 in which boys and girls accounted for 48.7% and 50.9% of cases, respectively, though girls have a higher risk of suffering sexual abuse.^{6,7} Examining the characteristics of maltreatment perpetrators in FFY 2012, 82.2% were between the ages of 18-44, 53.5% were women and 45.3% were men. Tallying perpetrators for each incident of maltreatment, the Children's Bureau reported that 81.5% of victims were maltreated by one or both parents and that 88.5% of these were biological parents.⁶

1.2 AN ECOLOGICAL APPROACH TO CHILD MALTREATMENT AND RISK FACTORS

The high prevalence of child maltreatment along with the associated economic burden and contribution to disease underscore the need to explore maltreatment etiology and promote prevention. Understanding of the causes of maltreatment has progressed with the recognition that no single risk factor is responsible for its occurrence.¹⁰ Rather, a constellation of interacting factors at various levels makeup the ecologic approach used to describe the etiology of child maltreatment.^{7, 10-12} Applying the social-ecological framework to maltreatment, this perspective recognizes the interaction of risk factors at different levels of the social environment that contribute to an outcome including those in the individual, relationship, community, and societal level^{13,14}. Although a conclusive model has yet to be determined, most officials and investigators categorize the risk factors into four domains including child factors, parent or caregiver factors, family factors, and environmental or community factors.^{11, 12}

1.2.1 Child Risk Factors

A number of characteristics have been shown to make children more vulnerable to maltreatment although research has demonstrated mixed results for several.¹⁵ Younger age has been associated with higher risk for certain types of maltreatment such as neglect and shaken baby syndrome.^{11,12} Other child risk factors include premature birth, low birth weight, behavioral and developmental problems, cognitive impairment, and disability.^{11,12,15,16} Older children and females may experience greater risk for sexual abuse.^{7,11} Child characteristics may exacerbate the risk of maltreatment particularly when combined with specific parental characteristics that impede coping with child difficulties.¹² In turn, maltreatment may further reinforce these child behaviors, such as aggression, that increase risk the incidence of maltreatment as well as maltreatment reoccurrence.¹²

1.2.2 Parent or Caregiver Risk Factors

A variety of parental factors including attitudes, knowledge, and psychological well-being have been associated with an increased risk for maltreating a child.¹² In general, the four most commonly identified factors with associations to subsequent maltreatment include young parental age, low parental educational achievement, a history of adverse experiences including maltreatment, maternal smoking during pregnancy, and the history of or current drug use or alcohol abuse.^{2,7,15,16} Despite the increased risk associated with a history of maltreatment, research has demonstrated that most families do not perpetuate the cycle of abuse and that stable and nurturing relationships with partners and children may break the cycle.^{12, 17} Personality characteristics of maltreating parents have been hard to identify. However, behavioral and

emotional difficulties such as poor impulse control, depression, anxiety, antisocial behavior, and low self-esteem in parents have been linked to child maltreatment.¹² Attitudes such as unhappiness regarding pregnancy and unfamiliarity with normal child development and certain stressful situations may increase risk and exacerbate other important risk characteristics such as emotional well-being and depression.^{10, 12,16}

1.2.3 Family Risk Factors

The structure and dynamics of families play an important role in characterizing the risk of maltreatment. Single parenthood, particularly for mothers, increases the risk for physical abuse and neglect while the presence of a step parent increases the risk for sexual abuse.^{11,12,15,16} Lower income, poverty, and receiving social assistance intensify stress levels and contribute to the cumulative risk for maltreatment.^{10,12} Family size also plays an important role with families having more than two children at an increased risk.^{10,15, 16} Domestic violence is also recognized as a risk factor as the presence of intimate partner violence and spousal abuse increases the potential for children to become a victim of the physical abuse.^{12, 17} Parents that are the victims of abuse themselves have an increased risk of neglecting a child.¹² Witnessing domestic violence can cause emotional harm and suffering in children and leave an impact from an environment accepting of violence even if the abuse does not result in maltreatment.^{12, 17}

1.2.4 Community Risk Factors

Community risk factors are often found in conjunction with factors from other domains of the ecological model and alone, like a history of maltreatment in parents, do not result inevitably in

maltreatment. The majority of parents living in high risk communities with high risk do not maltreat children although the presence of certain community factors have been shown to contribute to an increased risk.¹² Poverty and unemployment play a critical role in maltreatment with strong links particularly to neglect.^{11,12} A child's risk of being maltreated is also increased by living in violent communities that promote an environment in which violence is deemed an appropriate behavior.^{11, 12, 18} Lack of social networks and cohesion, exacerbated by violence and minimal involvement from community agencies further contribute to maltreatment.^{12,16,18} Substantial evidence indicates the importance of social support in reducing the risk of maltreatments particular for families already at high risk.^{12,15,16}

1.3 OVERALL ECOLOGICAL MODEL IN ALLEGHENY COUNTY

Factors in each of the four domains play an important role in impacting the risk for child maltreatment. However, the overall constellation of these characteristics and the interactions at all levels ultimately shape the circumstances for child maltreatment, as described by the ecological framework. Understanding child maltreatment conditions in a community such as Allegheny County, therefore, requires an examination of the presence and prevalence of factors in the child, parent, family, and community domains. Examination of the earliest risk factors is an important step in guiding interventions in primary prevention that may reduce maltreatment prevalence in Allegheny County.²

1.4 LONG-TERM IMPACTS AND PUBLIC HEALTH SIGNIFICANCE

Beyond the individual acts, maltreatment has far-reaching and long-lasting impacts on the children affected and society as a whole.^{7,19,20} These consequences influence outcomes in physical and mental health, criminal behavior, and education.⁷ Those with a history of experiencing abuse have a higher risk for somatic symptoms including several forms of bodily pain (chest, pelvic, stomach, and back pain), headaches, loss of appetite, and sleep dysfunctions.¹⁹ Combinations of many symptoms often manifest into diagnoses such as fibromyalgia, chronic fatigue syndrome, or irritable bowel syndrome and an overall reduced health-related quality of life in adulthood.^{19,21} Lifelong adverse impacts may also stem from a number of associated mental health conditions such as depression, anxiety disorders, post-traumatic stress disorder, obsessive-compulsive disorders, and suicide ideation.^{19, 22,23} As adults, individuals with histories of maltreatment have demonstrated lower levels of education, employment, and earnings associated with an overall decreased economic well-being.²⁴ Results from studies have consistently shown increased risks for difficulties in school, delinquency, and criminal behavior including an increased risk to abuse children as an adult.¹¹ As a result, child maltreatment translates into an economic burden for both the affected individual and society. Child and adult medical costs, productivity losses, child welfare, special education, and criminal justice costs result in an average lifetime cost per victim of nonfatal maltreatment of \$210,012, and a total lifetime cost for new cases of fatal and nonfatal maltreatment of \$124 billion in the United States.²⁰

Recognition of the serious adult health outcomes associated with maltreatment grew after groundbreaking research in The Adverse Childhood Experiences (ACE) Study at the Kaiser Permanente health care system²⁵. With over 17,000 participants, the study performed

comprehensive medical evaluations on each subject and administered confidential questionnaires to collect retrospective information on childhood maltreatment, household dysfunction, and current health behaviors and status.²⁵ Ten categories of childhood trauma were assessed including physical abuse, emotional abuse, sexual abuse, physical or emotional neglect, witnessing domestic violence, mental illness in the home, substance abuse in the home, incarceration of a family member, and parental separation or divorce. Based on the number of categories of abuse experienced by the individual in childhood, an ACE score was developed on a scale of 0-10 to assess childhood stress.²⁶ Analysis of the data demonstrated that exposure to any one category increased the probability of exposure to another category. In addition, a graded relationship was observed between the number of exposures and adult health risk behaviors such as smoking, alcoholism, illicit drug use, and 50 or more intercourse partners. The graded relationship extended even further to adult diseases such as ischemic heart disease, cancer, chronic lung disease, skeletal fractures, and liver disease.²⁵ Findings also demonstrated that these experiences act as a critical risk factor for an overall poorer quality of life in later years and adulthood.²⁷

Results illustrate the common occurrence of ACEs, which include child maltreatment, in the United States. Of those who participated in the original study, almost two-thirds reported at least one ACE, and more than one in five reported abuse in more than three different categories.²⁸ States have increasingly incorporated ACE information on the Behavioral Risk Factor Surveillance Survey (BRFSS) with five states reporting results in 2010. Examining results from the 2009 BRFSS in Arkansas, Louisiana, New Mexico, Tennessee, and Washington, 59.4% of the sample of 26,229 respondents reported having at least one ACE and 8.7% reported five or more ACEs. While household substance abuse demonstrated the highest prevalence at 29.1%,

child maltreatment categories remained high as 14.8% of those responding reported physical abuse, 12.2% reported sexual abuse, and 25.9% reported verbal abuse.²⁹ Evidence has accumulated to show graded increased risk of current smoking, alcohol abuse, liver disease, depressive disorders and hallucinations in those with ACEs.³⁰⁻³⁴ The increased risk is related to many of the leading causes of death and risky health behaviors. Along with ischemic heart disease, cancer, obesity, and chronic obstructive pulmonary disease (COPD), there is an increased risk for intimate partner violence, sexual risk behaviors and sexually transmitted diseases, teenage pregnancy, suicide attempts, and illicit drug use.^{28, 35} These findings contribute to the growing understanding in public health that risk factors for many chronic diseases tend to cluster and that the distribution of disease is not random.³⁶ Therefore, understanding these links associated with ACEs and child maltreatment and their part in disease development may play a significant role in disease prevention. Targeting interventions towards reducing maltreatment may lessen these risk factors and prevent disease development, thereby improving overall public health.

1.5 OBJECTIVES

To highlight areas in need of greater attention and help shape strategic prevention methods, the primary objective of this study was to describe the prevalence of risk factors for maltreatment at various levels of the ecological framework in Allegheny County. Furthermore, an additional objective was to compare the prevalence of risk factors in Allegheny County to that of Philadelphia County. The Community Health Status Indicators Project has selected county peer groupings using demographic variables to allow for health outcome comparisons. Philadelphia

County was chosen as a comparison county as it has been labeled as a peer county to Allegheny County with a similar population size.³⁷ With a focus on the prevalence of early risk factors, information provided by this descriptive study may help target future early intervention programs for at risk families in order to reduce and prevent child maltreatment in Allegheny County.

2.0 METHODS

2.1 DATA SOURCES

Data for the evaluation was collected from three different sources of publicly available data. The Centers for Disease Control and Prevention (CDC) Wonder database provided information regarding premature birth, low birth weight, maternal tobacco use during pregnancy, maternal educational level, prenatal care, births to mothers less than 20 years of age, birth order, and maternal marital status. The data in the CDC Wonder Natality online database for 2007-2012 provided information derived from birth certificates.³⁸ Data regarding the proportion of mothers on Medicaid and using WIC were provided through the Pennsylvania Department of Health's Epidemiologic Query and Mapping System (EpiQMS) using the Pennsylvania Birth Certificate Dataset.³⁶ Community risk factor data for unemployment was retrieved from the Health Indicators Warehouse developed by the National Center for Health Statistics and the Bureau of Labor Statistics for county level data.^{40, 41} Data on poverty was collected through the Health Indicators Warehouse as well as the Small Area Income and Poverty Estimates (SAIPE) program created by the U.S. Census Bureau and other federal agencies.^{42, 43}

2.2 RISK FACTOR DEFINITIONS

Research on child maltreatment has increasingly shifted its focus onto primary and secondary prevention strategies and identifying high-risk populations, even before birth, to implement prevention at the earliest possible time.^{1,2,44} There has also been a recognized need for documentation of individual, community-specific, and population-based risk factors.⁴⁴ As a result, this assessment utilizes perinatal and sociodemographic risk factors of mothers and infants associated with early maltreatment as identified in the literature and population-based studies.^{2, 44}

2.2.1 Child Risk Factors

Two risk factors related to the child were used in this study. **Premature birth** was defined as the live birth of an infant less than 37 weeks gestational age. **Low birth weight** was defined as the birth weight of a live-born infant less than 2,500 grams.

2.2.2 Maternal Risk Factors

In order to assess parental or caregiver risk factors, four maternal risk factors were chosen for this study. The maternal risk factor of **smoking during pregnancy** was defined as the reporting of a definitive “yes” regarding tobacco use during the pregnancy on birth certificate data. **Young maternal age** was defined as birth of an infant to a mother less than 20 years of age. **Low maternal education** was defined receiving less than a high school degree including completion of an 8th grade education or less and education from 9th through 12th, grade but with no high school diploma. Comparing care during pregnancy, the **late or no prenatal care** risk factor was

defined as receiving no prenatal during pregnancy or initiating prenatal care after the beginning of their third trimester from seven months onwards.

2.2.3 Family Risk Factors

This study used four family risk factors in the comparison of Allegheny County and Philadelphia County. To represent single parenthood, **unmarried mothers** were defined as those reporting an unmarried marital status at the time of birth. In order to evaluate large family size as a risk factor, the number of siblings was evaluated by birth order information. **Large family size** was defined as having two or more siblings estimated by the birth order information including infants that were the third born child to a mother and up. Receiving social assistance was characterized by two risk factors including mothers on **Medicaid** at time of birth and those enrolled in the **Women, Infants, and Children (WIC)** federal assistance program to supply special supplemental nutrition.

2.2.4 Community Risk Factors

Two risk factors in the community domain were evaluated for both counties. **Unemployment** as a community risk factor was defined as the percentage of civilian non-institutionalized population age 16 and older in the county reporting unemployment or looking for work. **Poverty** was defined as the proportion of the population living below the poverty line using estimates from the Small Area Income and Poverty Estimates (SAIPE) for county poverty statistics.

2.3 DATA ANALYSIS

This report included data from the most recent time period for which information was available for all risk factors covering the interval from 2007 to 2011. Data were presented for 12 risk factors that cover the four domains of the ecological framework for Allegheny County and Philadelphia County. For each risk factor, prevalence (% per year) and trend were presented for each county.

Percentages and graphics in this report were generated for each factor and included Allegheny County and Philadelphia County. Analysis of risk factors provided by birth certificate data included only those with a specific notation for factor in the total count. The prevalence was calculated by using the total live births each year for the specific county. The total counts include those with a specific notation on the absence of the risk factor as well as those in which the status was not stated or unknown for preterm birth, low birth weight, maternal tobacco use, low maternal education, prenatal care, marital status, and family size. A pairwise comparison between Allegheny County and Philadelphia County was performed for each risk factor by year. A chi-square test was performed using Small STATA 13.1 (version 13, STATA Corporation, College Station, TX, USA). Two sided p-value of <0.05 was considered statistically significant.

3.0 RESULTS

3.1 INCIDENCE OF CHILD RISK FACTORS IN ALLEGHENY COUNTY

Child maltreatment risk factors were analyzed for 65,839 total live births in Allegheny County and 117,492 total live births in Philadelphia County from 2007 to 2011 using birth certificate data (Table 1). During this five year time period, a total of 8,077 infants in Allegheny County were born preterm while Philadelphia County had 16,293 premature births. The highest incidence of preterm births in Allegheny County occurred in 2011, when a total of 1,714 infants were born prior to 37 weeks gestation with an incidence of 13.1% of all live births. In comparison, the incidence of premature live births peaked in 2007 in Philadelphia County at 14.8% with 3,494 premature infants (Figure 1). There was a statistically significant difference between the two counties from 2007 to 2009 (all p-values<0.0001). Although Philadelphia had a higher proportion all five years, no statistically significant difference occurred during 2010 and 2011 (p=0.37 and p=0.73, respectively).

During the assessed period, 5,433 infants in Allegheny County were born with low birth weight compared to 13,108 infants in Philadelphia County. The largest incidence of low birth weight births occurred in Allegheny County during 2008 at 8.9% of all live births and 1,183 infants (Figure 2). A statistically significant difference in low birth weight births was observed

between the two counties during each of the five years assessed with higher incidence in Philadelphia County each year (all p-values<0.0001).

3.2 PREVALENCE OF MATERNAL RISK FACTORS IN ALLEGHENY COUNTY

Examination of tobacco smoking during pregnancy demonstrated a significant difference between Allegheny County and Philadelphia County over all five years assessed (all p-values<0.0001). During each of these five years, Allegheny County had a higher proportion of maternal smokers than the comparison county (Figure 3). However, maternal smoking declined from 2007 to 2011 in both counties. Peak smoking level occurred in 2007 for each county reaching 17.7% and 11,021 smoking mothers in Allegheny County compared to 12.6% in Philadelphia County with 20,628 smoking mothers.

From 2007 to 2011, births to mothers of young age decreased from 7.8% to 5.8% in Allegheny County except during 2008. The highest proportion of births to young mothers in occurred during 2008 with 1,048 infants born to mothers less than 20 years of age accounting for 7.9% of all live births (Figure 4). In comparison, births to young mothers decreased in Philadelphia County from 15.6% to 12.0% during the 2007 to 2011 period with the highest level observed during 2007 (3,694 young maternal births). There was a statistically significant difference in young maternal births between the two counties compared for all five years (all p-values<0.0001).

Births to mothers with a low education level also decreased in both Allegheny County and Philadelphia County from 2007 to 2011 (Figure 5). Low maternal education dropped from 9.3% to 7.6% in Allegheny County. The peak percentage occurred in 2007 in both Allegheny

County and the comparison county. During 2007, Allegheny County had 1,247 births to mothers with less than a high school degree while Philadelphia County had 5,872 low maternal education births accounting for 24.9% of live births. In comparison to Allegheny County, the lowest prevalence of low maternal education births was 20.6% in 2011. A statistically significant difference in low maternal education between the comparison counties was observed for each of the examined years (all p-values<0.0001).

A total of 536 births occurred to mothers with no or late prenatal care in Allegheny County during 2007. At this peak, 4.0% of all live births were to mothers with limited or no prenatal care in the county (Figure 6). The difference between Allegheny County and Philadelphia County in no or late prenatal care was statistically significant for all five year (all p-values<0.0001). In comparison, the highest prevalence in Philadelphia County occurred during 2010 with 3,002 births to mothers who had received no or late prenatal care accounting for 12.9% of all live births.

3.3 PREVALENCE OF FAMILY RISK FACTORS IN ALLEGHENY COUNTY

From 2007 to 2011, births to unmarried mothers in Allegheny County remained stable with 38.8% in 2007 and 38.6% in 2011 (Figure 7). The highest prevalence occurred during 2008 with 5,275 births to unmarried mothers accounting for 39.7% of all live births. In comparison, births to mothers with an unmarried maternal status remained steady in Philadelphia from 2007 at 64.9% to 64.5% in 2011 with a peak in 2010. During the highest year in the comparison county, 65.0% of all live births occurred among unmarried mothers. Each of the examined years

demonstrated a statistically significant difference in unmarried mothers between the compared counties (all p-values<0.0001).

Examining family size in Allegheny County from 2007 to 2011 demonstrated a slight decrease in mothers experiencing their third or higher birth, except in 2010 (Figure 8). The prevalence dropped from 24.4% in 2007 at the county's peak, to 23.0% in 2011. In 2007, the year with the highest prevalence for Allegheny County, 3,262 mothers gave birth to their third or higher child. In contrast, the prevalence in Philadelphia increased from 27.7% in 2007 to a peak of 28.9% in 2011. In each of the years assessed, a statistically significant difference was observed between Allegheny County and Philadelphia County (all p-values<0.0001).

A total of 4,285 mothers that gave birth in Allegheny County, 33.6% of all live births, were on Medicaid at the highest prevalence of utilization in 2008. Over the examined period from 2007 to 2011, the percentage of mothers on Medicaid at birth decreased from 32.6% to 25.8% in the county (Figure 9). In each year, there was a statistically significant difference in utilization compared to Philadelphia County which had higher prevalence of Medicaid use among new mothers for all five years (all p-values<0.0001). The percentage increased dramatically in the comparison county from 45.6% in 2007 to its peak of 55.0% in 2011.

A statistically significant difference was also seen for each year of comparison between Allegheny County and Philadelphia County in new mothers using the WIC supplemental nutritional program with a higher prevalence in Philadelphia County(all p-values<0.0001). The prevalence in Allegheny County remained stable with 31.4% participation in 2007 and 30.8% in 2011 with a peak of 32.1% in 2009 (Figure 10). During the peak year of 2009, 4,170 mothers reported using the WIC program. The prevalence of WIC use increased in Philadelphia County

from 59.6% of new mothers using the program in 2007 to its highest prevalence of 61.2% use in 2011.

3.4 PREVALENCE OF COMMUNITY RISK FACTORS IN ALLEGHENY COUNTY

Examination of the level of unemployment in each county from 2007 to 2011 demonstrated a significantly lower prevalence in Allegheny County than that in Philadelphia County in each year of the study period (all p-values<0.0001). The unemployment prevalence increased from 4.1% in 2007 to 7.0% in 2011 in Allegheny County (Figure 11). The highest prevalence was observed in 2010 when 48,296 reported unemployment out of the 642,521 individuals in the labor force (7.51%). In comparison, Philadelphia County also experienced an increase in unemployment from 6.0% to 10.9% prevalence from 2007 to 2011 with the highest prevalence observed in 2011.

Poverty in Allegheny County varied from the lowest of 11.6% in 2007 and peaked at 13.4% in 2011 (Figure 12). During this year, a total of 159,663 individuals lived in poverty out of the 1,193,487 individuals accounted for in the poverty universe (made up of all individuals whose poverty status can be determined) reported by the Census Bureau. A statistically significant difference in poverty was observed between Allegheny County and Philadelphia County for each year examined with Philadelphia County consistently reporting a higher prevalence (all p-values<0.0001). The prevalence of poverty in the Philadelphia County community increased from 23.5% in 2007 to a peak of 27.9% in 2011.

4.0 DISCUSSION

Allegheny County demonstrated notable risk factors in each domain of the child maltreatment ecological framework with several important trends. Previous studies have demonstrated the importance of these exposures in elevating the risk for child maltreatment. Greater understanding of these risk factors aids in the development of tools to identify high risk families and target appropriate interventions. The methods used in this study to examine the prevalence of these characteristics across counties have both strengths and weaknesses. However, the data collected can be used to guide future interventions targeted at preventing child maltreatment.

4.1 RISK FACTOR IMPORTANCE

Results from this report have demonstrated that these risk factors are prevalent in Allegheny County and comparable to national data. However, there are targeted areas that are unique to Allegheny County.

Preterm births across the United States reached 12.7% of all live births in 2007, prompting the U.S. Department of Health and Human Services to set a Healthy People 2020 goal of 11.4%.⁴⁵ Preterm births in the U.S. dropped each year from 2007 to 2011 to 11.7% contrary to the increase observed each year in Allegheny County with 13.1% in 2011.⁴⁶ The prevalence of low birth weight infants also decreased in the U.S. to 8.1% towards the Healthy People 2020

goal of 7.8% illustrating that this goal has not been achieved nationally.^{45,46} Allegheny County only surpassed this goal in 2011, the most recent year examined, indicating the need for continued efforts and attention.

Tobacco use during pregnancy remains one of the most striking risk factors in Allegheny County. The Healthy People 2020 goal aims to increase abstinence from smoking during pregnancy to 98.6% given the national prevalence of 89.6% in 2007.⁴⁵ The reduction of maternal smoking in Allegheny County to 14.7% remained higher than the national baseline used to set this goal. Though Philadelphia County had a higher prevalence for the majority of the factors examined, the mere presence of all of these risk factors individually and combined in Allegheny County has continuing implications for the risk of maltreatment and the well-being of children in the county.

Research has demonstrated the importance of each of the described risk factors in contributing to the incidence of child maltreatment. These risk factors may contribute to stressful conditions, or act as markers for stress and attitudes as with maternal tobacco use, that escalate the potential for maltreatment.^{2,10-12} Finding similar relative risks for predictors when stratifying by types of abuse and neglect, a Florida population-based study found 11 risk factors significantly associated with elevated risk for maltreatment. These predictors included a maternal education less than high school, inadequate prenatal care, and a maternal age of less than 20 years old while WIC participation was not significant. Five additional factors also examined in this analysis demonstrated adjusted relative risks of two or greater in the Florida study including maternal smoking during pregnancy, family size or infant with more than two siblings, maternal Medicaid beneficiary during pregnancy, unmarried maternal status, and infant born low birth weight.²

More recently, a population-based study in Alaska demonstrated the significance of these factors with the strongest main effect associations including high risk maternal age and education, domestic violence/sexual assault, maternal tobacco use, an unmarried maternal marital status, substance abuse in the home, two or more living children, medical vulnerability, and receiving public aid.⁴⁴ Other studies have also supported the significance of examined maternal and child risk factors such as young maternal age, low maternal educational achievement, and more children in the family along with other factors such as maternal drug use, depressive symptoms, history of abuse or absence of father and low developmental assessments scores among children.^{16, 47}

Further studies have demonstrated the importance of socioeconomic and family factors including poverty and deprivation as strong risk factors. Addition of these socioeconomic factors moderates the strength of effects found with parental backgrounds indicating the possible presence of a cycle of poverty, although socioeconomic factors may be associated with maltreatment through alternative channels to affect maltreatment risk.¹⁵ Most importantly, research has demonstrated the importance of examining maltreatment through cumulative risk and a multifactorial perspective.^{2, 10, 48}

4.2 PREVENTION STRATEGIES

Increasing evidence regarding these risk factors for maltreatment along with a greater focus on earlier prevention have brought about numerous strategies to target modifiable factors among high risk groups. Efforts to develop screening tools have grown in order to successfully identify families at high risk for maltreatment and provide assistance. The Child Abuse Potential

Inventory (CAP), developed in the late 1970s, has been a widely used screening instrument to differentiate abusing parents with strengths and limitations.^{1,49} Despite high predictability, reliability, and simplicity in administration, the tool contains a cumbersome 160 self-report items which include several personal questions. The lengthy questionnaire increases the burden on participants and complexity in scoring makes the tool difficult to use for community agencies.⁴⁹ Development of the Brief Child Abuse Potential Inventory (BCAP) evolved out of an effort to simplify the CAP. Although it is a shorter instrument, questions remain regarding the validity in the general population due to a questionable samples used in its construction.^{1,49} The Structured Problem Analysis of Raising Kids (SPARK) is another potential questionnaire aimed at identifying elements of child development and parental perspectives although no studies have been conducted to show its effectiveness in reducing maltreatment.¹⁸

One promising model is the Safe Environment for Every Kid (SEEK) which incorporates the parent screening questionnaire (PSQ) to target psychosocial risk factors such as substance abuse in the home, maternal depression, intimate partner violence, and stress.⁵⁰ Most recently, the Parenting Support Needs Assessment (PSNA), derived from the Parenting Risk Inventor, has undergone testing and shown validity, reliability, and clinical usefulness.¹ The screening instrument covers a wide range of risk items including maternal age, education, number of children younger than five years, depression, history of maltreatment, late prenatal care, unstable relationship, preterm birth, low birth weight, unstable economics and several others.¹ Successful identification of these families at high risk through primary care represents an important avenue for maltreatment prevention.

Universal screening for maltreatment risk requires an emphasis on modifiable factors and the availability of preventative services.¹⁸ A variety of prevention strategies have been proposed

covering a spectrum of risk factors including parent education programs, support groups for families with a history of domestic violence, home visitation programs, and substance abuse rehabilitation programs.¹² Recent reviews of these programs demonstrate that home visitation, parenting education, and child sexual abuse (CSA) prevention programs in particular perform effectively in reducing the risk factors involved in child maltreatment. Overwhelmingly, home visitation programs have displayed the most solid evidence and received the strongest endorsement.⁵¹⁻⁵³ Programs are not homogenously effective with differing models and staff however the Nurse-Family Partnership (NFP) program has shown the best evidence.⁵² These interventions involve visiting families in their homes by trained personnel such as nurses that provide support and education aimed towards enhancing parental caregiving skills and knowledge.⁵¹ Compellingly strong evidence has motivated the Task Force on Community Preventative Services to recommend early childhood home visitation programs to prevent child maltreatment.⁵³

4.3 STRENGTHS & LIMITATIONS

An examination across counties, this descriptive report incorporated numerous features that strengthened the assessment of risk factors for child maltreatment. The selected factors focused on early risks that contribute to child maltreatment. Therefore, future targeted interventions have the potential for earliest prevention that reduce both incidence and recurrence of maltreatment particularly among the youngest and most at risk children. Use of public data sources, including birth certificates, allowed for a broad county-wide perspective. Public data is also validated, readily available, and allows for comparisons across different geographic locations. The

availability of the data also allows for a continued evaluation of these risk factors in Allegheny County and compared to Philadelphia County. Finally, use of birth certificates to provide information on the majority of the risk factors examined allowed for a consistent source of data.

A variety of limitations encountered in this examination complicated the illustration of risk factor prevalence for maltreatment in Allegheny County and Philadelphia County. Research has recognized numerous risk factors that influence the incidence of child maltreatment. However, debate continues on the role and contribution of each factor as well as the structure of the cumulative risk as an additive effect or threshold effect.¹⁰ Data were not included on the incidence of maltreatment following the presence of the included risk factors preventing further analysis. Moreover, research has indicated the importance of alcohol or substance abuse, pregnancy intervals, abuse history, domestic violence, and maternal depression at varying levels in maltreatment risk for which inefficient data could be obtained.^{2,11,16,18} However, data on specific risk factors such as substance abuse in the home have been notoriously difficult to collect.^{6,11} While the Pennsylvania Behavior Risk Factor Surveillance System (BRFSS) collects data on depression and alcohol use, data could not be retrieved by county or specifically for mothers.⁵⁴ Calculations of the prevalence for each risk factor from birth certificate data utilized the total live births. This total included individuals for which the element was marked as unknown or not specified for seven risk factors which may have caused distortions in the representation of the true prevalence. Despite the limitations, the study identified risk factors that are modifiable and have important public health impact.

4.4 CONCLUSION

Examining the prevalence of risk factors for child maltreatment reveals several areas of needed improvement in Allegheny County. The data demonstrate a lack of improvement in the prevalence of premature births in the county. Maternal tobacco use during pregnancy has continued to remain substantially high. Family risk factors present another area of needed effort with little improvement demonstrated in births to unmarried mothers, and families in need of the WIC supplemental nutrition program. Data collected also illustrate the need to address increasing unemployment and poverty in the Allegheny County community which act as a risk factor for child maltreatment.

4.5 FUTURE IMPLICATIONS

Acknowledging the presence of these risk factors in Allegheny County is an important step in promoting appropriate measures of prevention. Recent findings from the Allegheny County Health Survey (ACHS) indicate the substantial need to address maltreatment in the area. In the 2009-2010 ACHS, 15% of all adults reported having a history of physical, emotional, or sexual abuse.⁵⁵ With an understanding of the important maltreatment risks in the county, applicable strategies can be implemented to address their prevalence. As screening tools such as the PSNA continue to develop, their implementation can be utilized to identify and direct these families towards proper services such home-visiting programs in Allegheny County.

Recognizing the evidence supporting the Nurse-Family Partnership (NFP) home visiting program and the described risk factors has implications for future policies targeting child abuse

and neglect in the county. The program provides nurse home visits to first-time low-income pregnant women from prenatal stages through the infant's first two years of life.^{11,18} Tested using three separate randomized controlled trials, the results from the 15-year follow of the first trial demonstrated that NFP significantly reduced the number of subsequent pregnancies, time using welfare, child abuse and neglect, behavioral impairments from alcohol and drugs, and criminal behavior.⁵⁶ As a provision of the Affordable Care Act, the Maternal, Infant, and Early Childhood Home Visiting (MIECHV) program provides funding for states utilizing evidence-based home visiting models approved by the U.S. Department of Health and Human Services including NFP.⁵⁷ Home visiting utilization and expansion have become a priorities with extended MIECHV funding from Congress through March 2015.⁵⁸ The use of this study data from Allegheny County highlights the need for investing in programs like NFP and prevention opportunities to address these risk factors. With extensive and long-term implications for health outcomes, reductions in child maltreatment and the associated risks can significantly improve public health in the United States.

APPENDIX A: TABLES

**Table 1. Prevalence of Risk Factors for Child Maltreatment in Allegheny County and Philadelphia County:
2007-2011**

	2007	2008	2009	2010	2011
Child Risk Factors					
Premature Birth					
Allegheny County	11.7%	12.5%	11.3%	12.9%	13.1%
Philadelphia County	14.8%	14.1%	14.0%	13.2%	13.2%
P-value	<0.0001	<0.0001	<0.0001	0.365	0.365
Low birth weight					
Allegheny County	8.6%	8.9%	8.1%	8.0%	7.7%
Philadelphia County	11.8%	10.9%	11.0%	10.9%	11.2%
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Maternal Risk Factors					
Smoking During Pregnancy					
Allegheny County	17.7%	16.7%	15.8%	14.9%	14.7%
Philadelphia County	12.6%	11.7%	11.8%	11.0%	10.2%
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Young Maternal Age					
Allegheny County	7.8%	7.9%	7.7%	6.8%	5.8%
Philadelphia County	15.6%	14.8%	14.1%	13.3%	12.0%
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Low Maternal Education					
Allegheny County	9.3%	8.5%	8.4%	8.4%	7.6%
Philadelphia County	24.9%	23.2%	23.1%	22.4%	20.6%
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Late or Not Prenatal Care					
Allegheny County	4.0%	3.4%	2.4%	2.7%	2.6%
Philadelphia County	10.1%	11.8%	12.8%	12.9%	11.4%
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Family Risk Factors					
Unmarried Mothers					
Allegheny County	38.8%	39.7%	39.3%	38.7%	38.6%
Philadelphia County	64.9%	64.2%	64.7%	65.0%	64.5%
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Large Family Size					
Allegheny County	24.4%	23.1%	22.9%	22.9%	23.0%
Philadelphia County	27.7%	28.5%	28.2%	28.6%	28.9%
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Medicaid Use					
Allegheny County	32.6%	33.6%	32.0%	22.9%	25.8%
Philadelphia County	45.6%	46.6%	51.0%	54.1%	55.0%
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
WIC Participation					
Allegheny County	31.4%	31.3%	32.1%	31.5%	30.8%
Philadelphia County	59.6%	58.7%	60.5%	60.6%	61.2%
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Community Risk Factors					
Unemployment					
Allegheny County	4.1%	4.9%	6.7%	7.5%	7.0%
Philadelphia County	6.0%	7.1%	9.6%	10.8%	10.9%
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Poverty					
Allegheny County	11.6%	12.4%	13.0%	11.9%	13.4%
Philadelphia County	23.5%	23.8%	24.5%	26.4%	27.9%
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

APPENDIX B: FIGURES

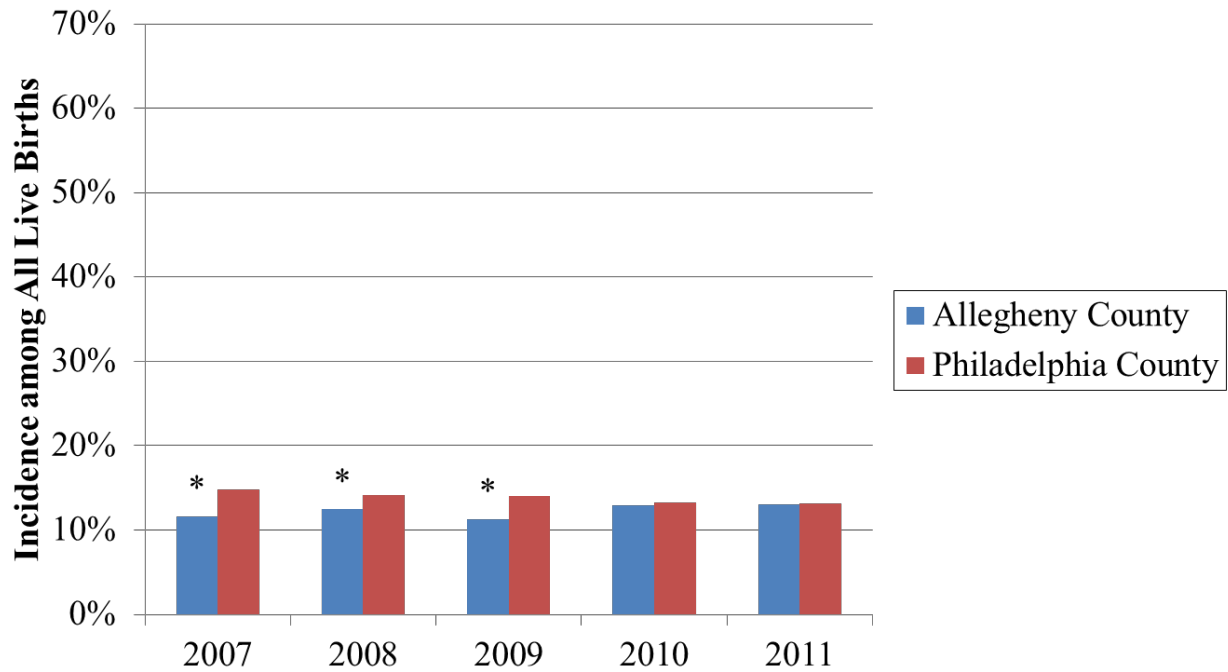


Figure 1 Preterm Births (<37 Weeks Gestation) by Year in Allegheny County and Philadelphia County, PA
Comparisons in years 2007, 2008, 2009 demonstrated statistically significant differences in births occurring premature (all p-values<0.0001). There was no statistically significant difference observed between the two counties for preterm birth in 2010 and 2011 with p-values of 0.365 and 0.734, respectively.

*Indicates statistically significant difference $p < .05$.



Figure 2 Low Birth Weight Births (<2,500 grams) by Year in Allegheny County and Philadelphia County, PA
 Statistically significant differences between the two counties were observed for each year from 2007 to 2011 in births of low birth weight (all p-values<0.0001).

*Indicates statistically significant difference p<.05.

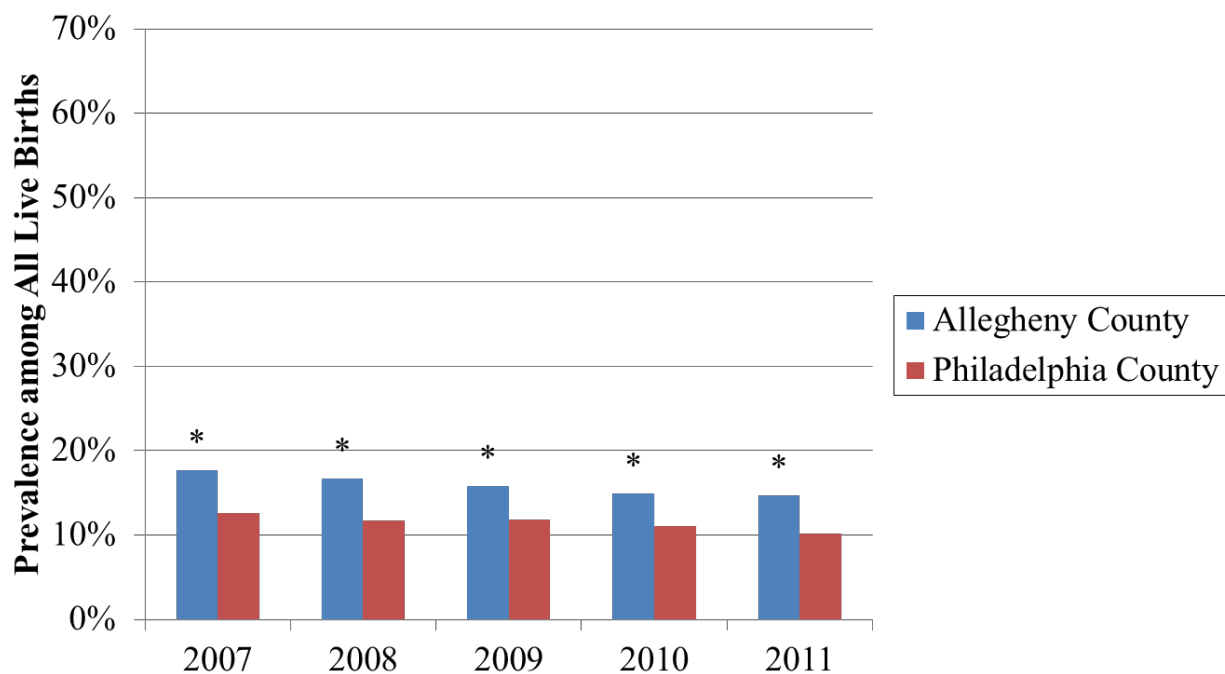


Figure 3 Maternal Tobacco Use by Year in Allegheny County and Philadelphia County, PA

Statistically significant differences between the two counties were observed for each year of comparison in births to mothers reporting tobacco use for each year during 2007 to 2011 with (all p-values<0.0001).

*Indicates statistically significant difference p<.05.

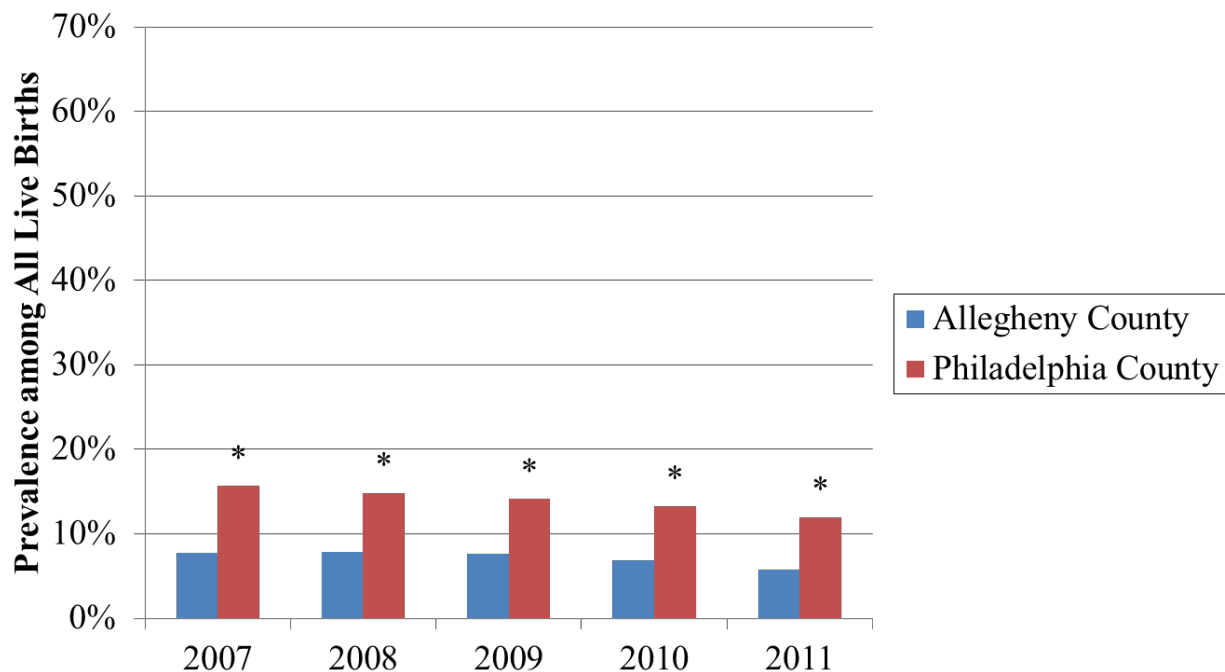


Figure 4 Young Maternal Age (<20 Years) by Year in Allegheny County and Philadelphia County, PA

Overall, the comparisons for births to mothers of young age demonstrated a statistically significant difference between the two counties for each year (all p-values<0.0001).

*Indicates statistically significant difference p<.05.

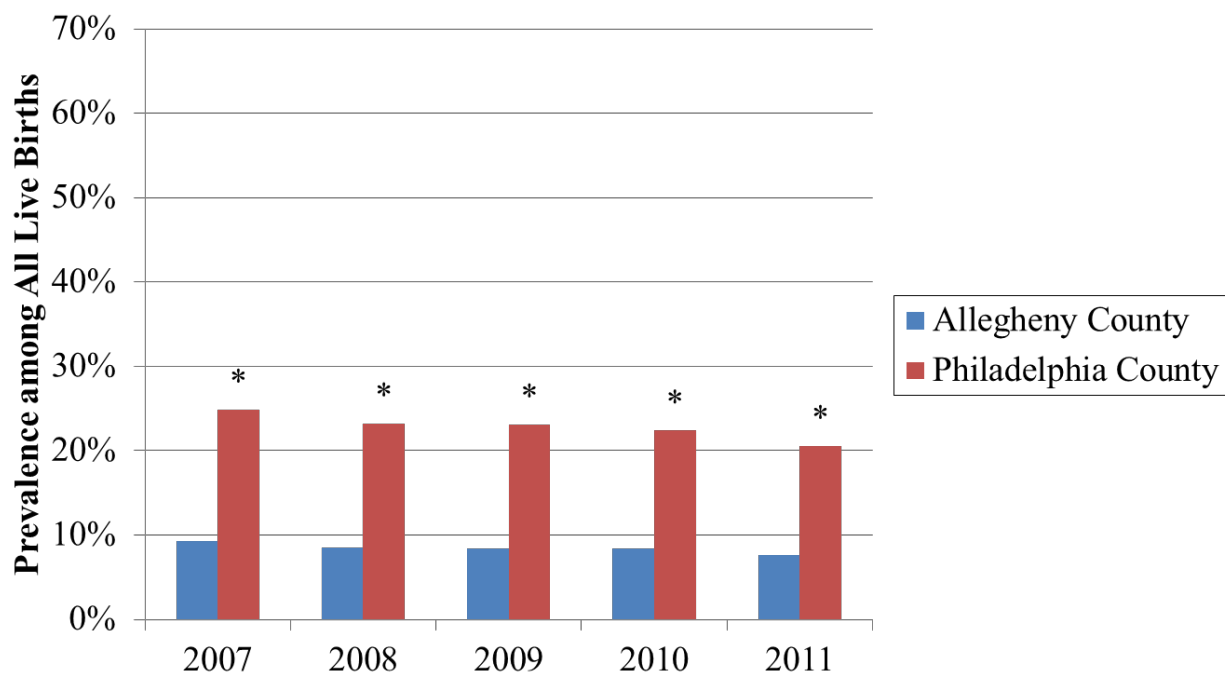


Figure 5 Low Maternal Education (< High School) by Year in Allegheny County and Philadelphia County, PA

Statistically significant differences between the two counties were observed (all p-values<0.0001) for each year of comparison in births to mothers with low education from 2007 to 2011.

*Indicates statistically significant difference p<.05.

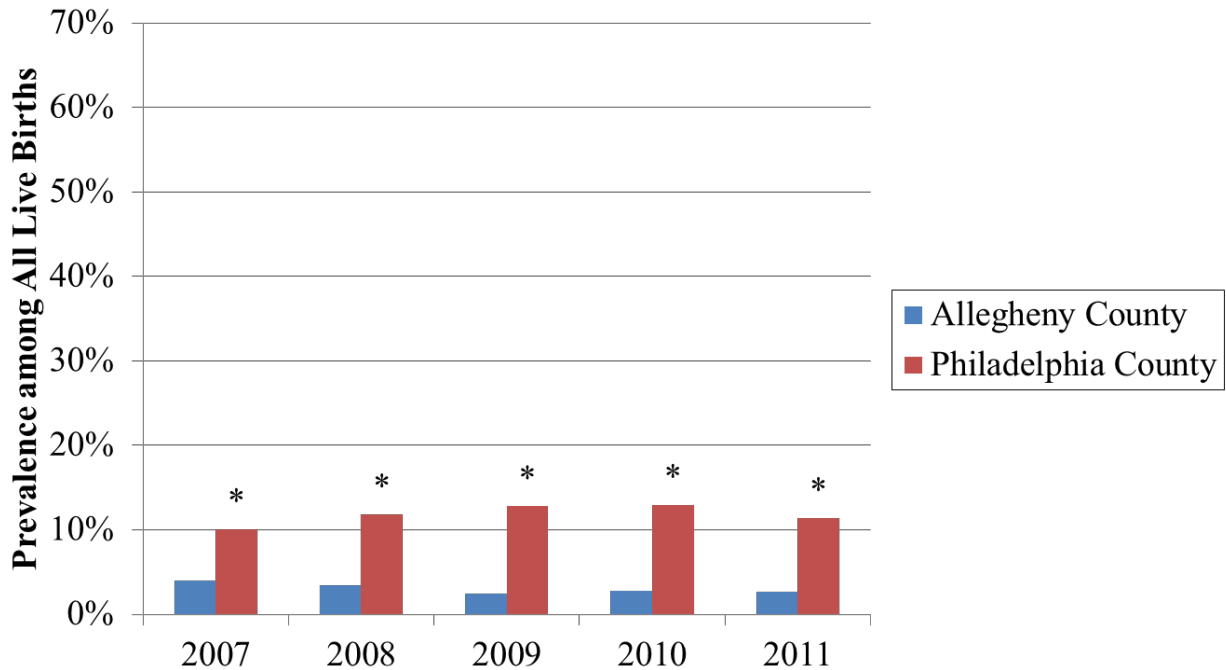


Figure 6 Late or No Prenatal Care by Year in Allegheny County and Philadelphia County, PA

A statistically significant difference was observed in the comparisons for each year from 2007 to 2011 (all p-values < 0.0001) in births to mother receiving late or no prenatal care.

*Indicates statistically significant difference $p < .05$.

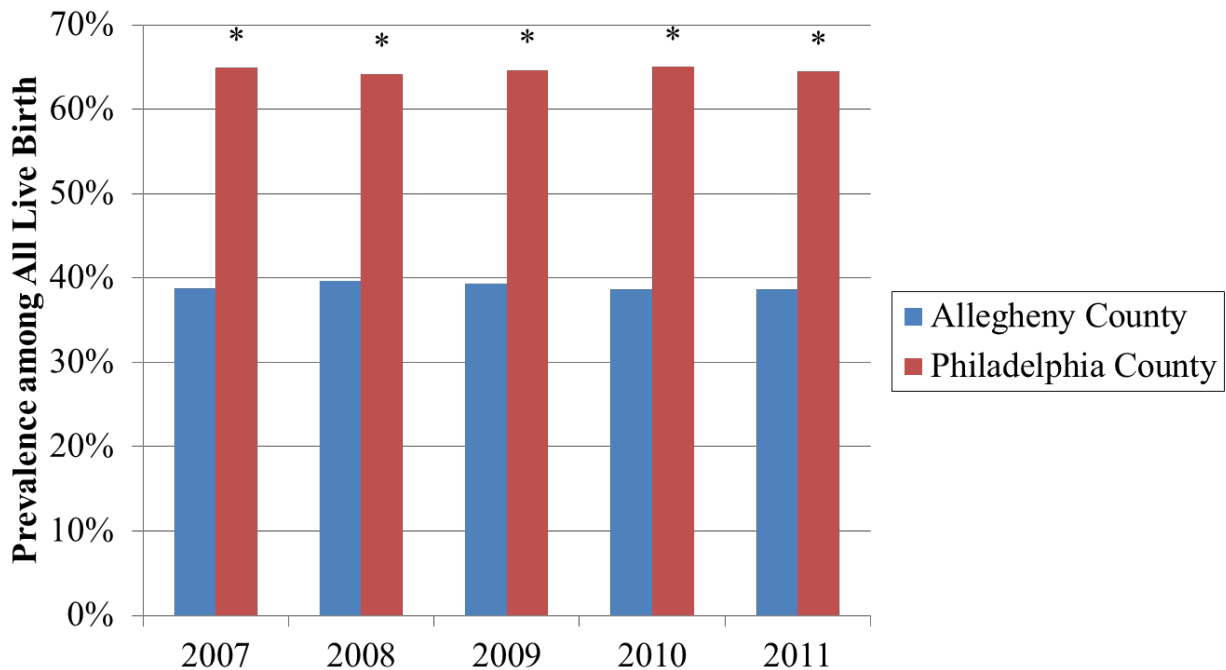


Figure 7 Births to Unmarried Mothers by Year in Allegheny County and Philadelphia County, PA

For each yearly comparison between the two counties from 2007 to 2011, a statistically significant difference was observed (all p-values < 0.0001) in births to unmarried mothers.

*Indicates statistically significant difference $p < .05$.

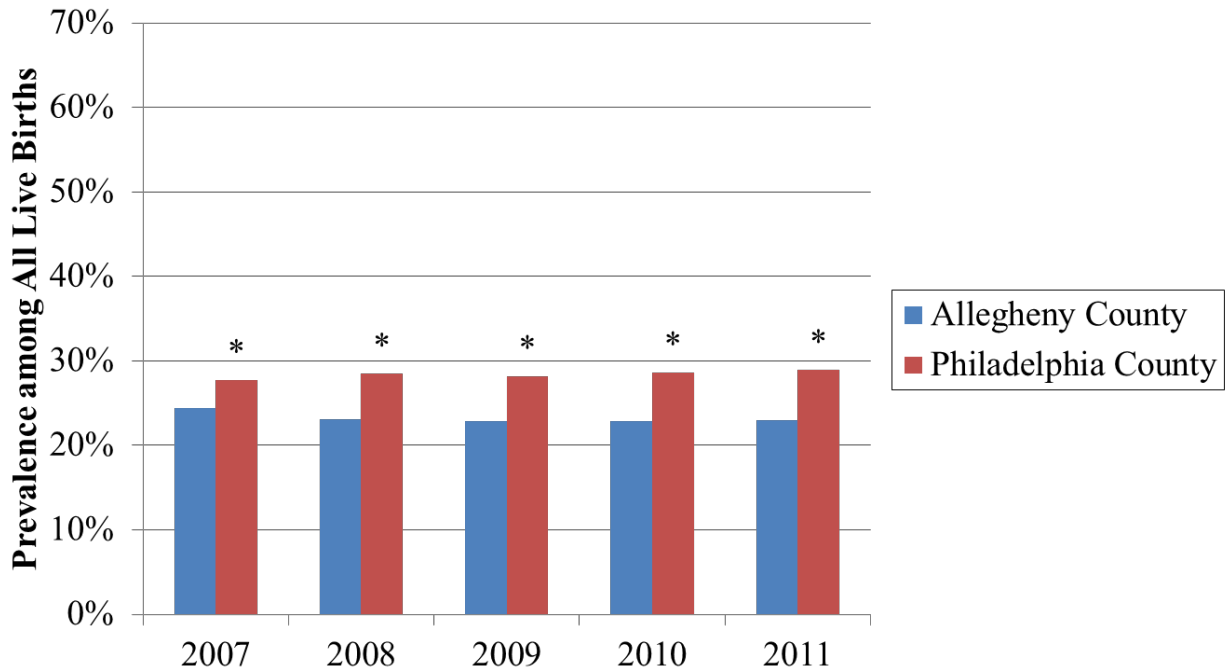


Figure 8 Third or Higher Births (At Least Two Previous Children) by Year in Allegheny County and Philadelphia County, PA

A statistically significant difference was observed between the two counties (all p-values < 0.0001) for each year during 2007 to 2011 in births to mothers that were their third or higher birth.

*Indicates statistically significant difference p < .05.

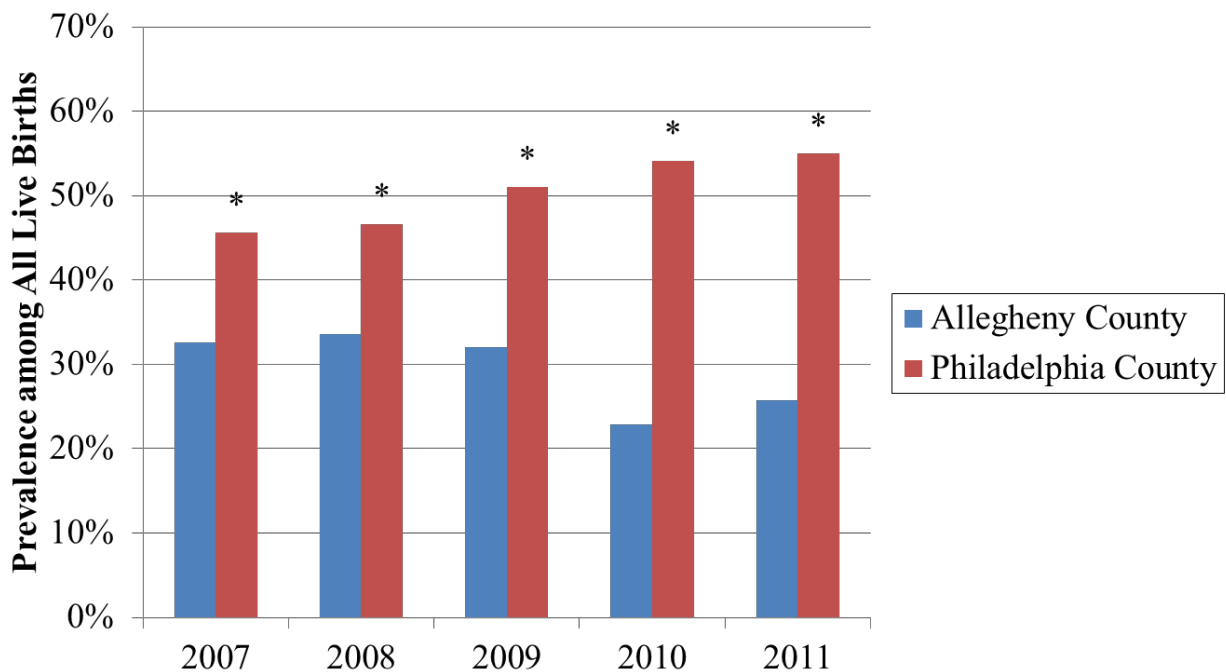


Figure 9 Births to Mothers Using Medicaid by Year in Allegheny County and Philadelphia County, PA

The difference between Allegheny County and Philadelphia County in births to mothers using Medicaid was statistically significant for each year of comparison from 2007 to 2011 (all p-values < 0.0001).

*Indicates statistically significant difference p < .05.

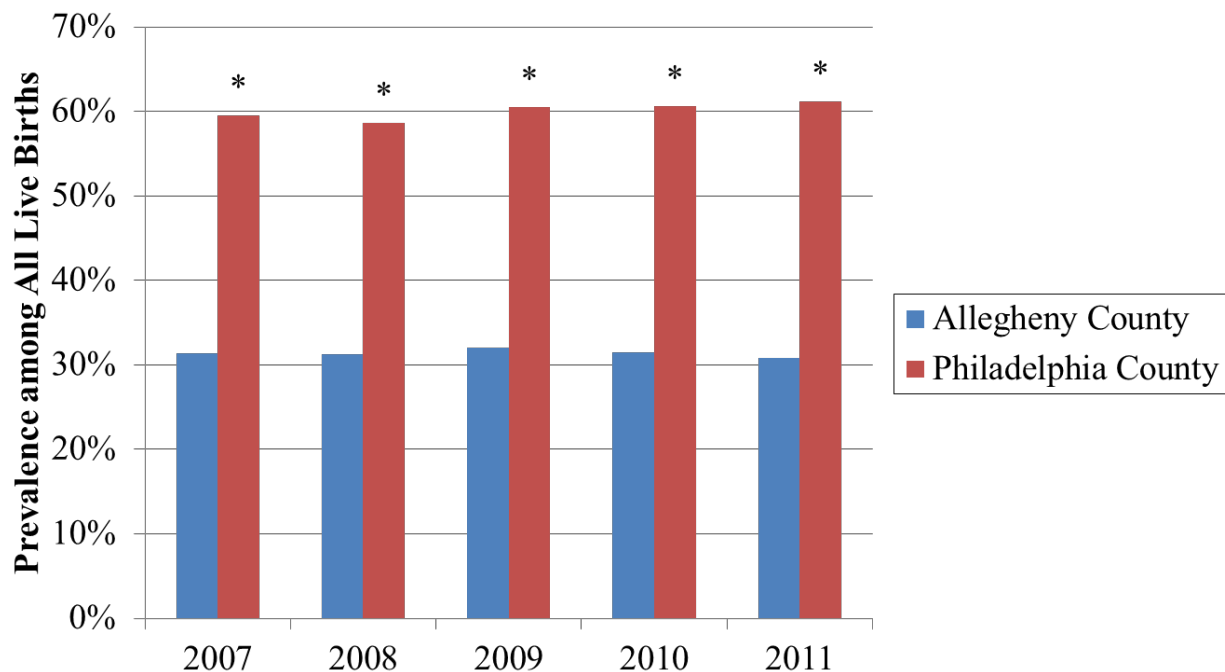


Figure 10 Births to Mothers Using WIC by Year in Allegheny County and Philadelphia County, PA

There was a statistically significant difference observed between the two counties for each year in births to mothers participating in the WIC program (all p-values<0.0001).

*Indicates statistically significant difference p<.05.

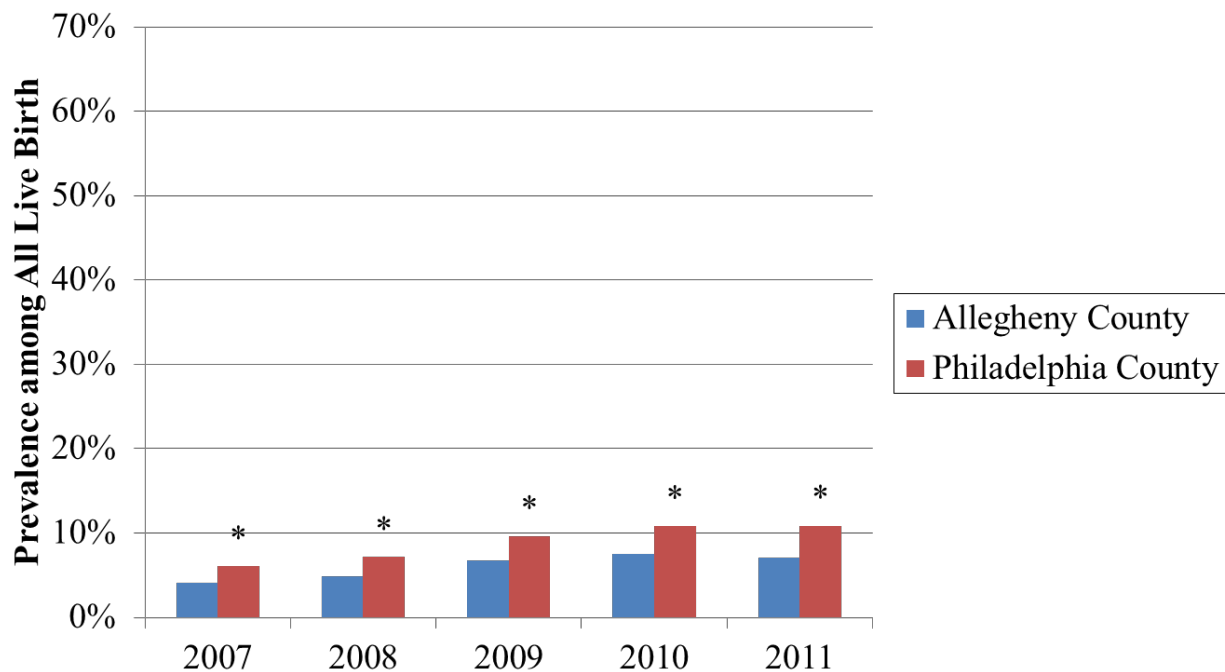


Figure 11 Unemployment by Year in Allegheny County and Philadelphia County, PA

A statistically significant difference was observed between the two counties (all p-values<0.0001) for each year of comparison in unemployment from 2007 to 2011.

*Indicates statistically significant difference p<.05.

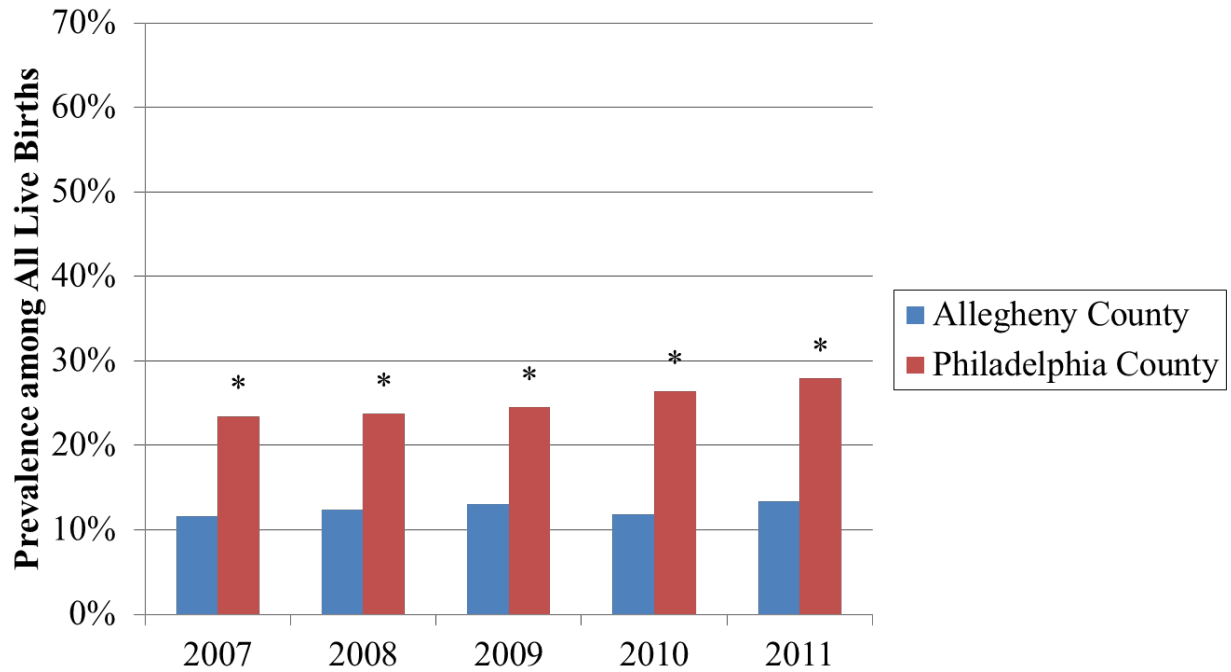


Figure 12 Figure 12. Poverty by Year in Allegheny County and Philadelphia County, PA

There was a statistically significant difference observed between the two counties in poverty for each year from 2007 to 2011(all p-values<0.0001).

*Indicates statistically significant difference p<.05.

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